CASE REPORTS

Phrenic nerve injury following blunt trauma

David Bell, Ajith Siriwardena

Abstract
Phrenic nerve trauma in the absence of direct injury is unusual and may present diagnostic difficulty. Diaphragmatic paralysis resulting from phrenic nerve injury may closely mimic diaphragmatic rupture. This case highlights the value of magnetic resonance imaging in establishing diaphragmatic integrity and of ultrasonographic assessment during respiratory excursion in confirming diaphragmatic paralysis. In cases of non-contact injury involving torsional injury to the neck, an index of clinical awareness may help to establish the diagnosis of phrenic nerve trauma.
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Case report

A 36 year old man was admitted to the accident and emergency department two hours after a road traffic accident. The patient was driving a car that had been struck on the nearside by another vehicle. The patient's vehicle had been stationary at the time of impact. The patient was wearing a seatbelt and reported that he had not struck his head. There was no history of loss of consciousness. He complained of pain in the head, neck and back. He had also briefly experienced paraesthesiae in the right hand but this had resolved by the time of arrival in the department.

At primary survey his neck was immobilised in a hard collar. He was maintaining his airway, self ventilating with a respiratory rate of 20/minute and there was decreased air entry to the right lower zone. The trachea was central. Cardiovascular examination was normal. Oxygen saturation was 97% on air and an electrocardiograph was normal. Secondary survey demonstrated severe lumbar spine tenderness over T12 and L1 vertebrae but no obvious neurological deficit. Physical examination was otherwise normal. His past medical history was significant for a myocardial infarction one year previously.

Radiographs of the cervical spine were normal. Lumbar spine films demonstrated a stable anterior wedge compression fracture of T12. Chest radiograph showed an elevated right hemi-diaphragm (fig 1). This was not evident on a chest film taken 12 months previously (fig 2). A provisional diagnosis of diaphragmatic rupture was made. Computed tomography demonstrated mild rotation of the axis of the liver (anti-clockwise rotation through the plane of the middle hepatic vein) compatible with diaphragmatic rupture. However, a magnetic resonance scan confirmed that the diaphragm was intact but elevated. Ultrasound scan with respiratory excursion demonstrated paralysis of the right hemi-diaphragm.

A diagnosis of right hemi-diaphragmatic paralysis secondary to phrenic nerve damage

Figure 1 Posteroanterior chest radiograph taken after injury showing elevated right hemi-diaphragm.

Figure 2 Posteroanterior chest radiograph taken 12 months before injury showing normal position of right hemi-diaphragm.

University Department of Surgery, Royal Infirmary of Edinburgh, Edinburgh

Correspondence to:
Mr Siriwardena, Department of Surgery, Manchester Royal Infirmary, Manchester M13 9WL
(ajith@mri3.cmht.nwest.nhs.uk)

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was made. The injury was treated conservatively with non-opioid analgesia for the lumbar spine injury. The patient remains well six months after injury with no clinical evidence of respiratory compromise. He has declined further assessment of diaphragmatic function.

Discussion

Traumatic phrenic nerve injury is well recognised after both penetrating and blunt trauma to the neck.[1 2] In contrast, injury as a result of distraction or stretching of the nerve is rare.[3] In several of these previous reports, a component of nerve damage may have been as a result of blunt trauma. There was no evidence of blunt trauma in this case with the mechanism of injury thought to be lateral hyperextension of the neck. There are no previous reports of phrenic nerve palsy by this mechanism.

Clinical manifestations of this injury include breathlessness, orthopnoea and respiratory distress.[4] The diagnosis may be suspected on chest radiography and computed tomography and confirmed by fluoroscopy or ultrasonography with respiratory excursion. An important practical consideration is that the clinical findings and radiological appearances on plain radiographs and computed tomography may mimic diaphragmatic rupture.

In summary, this case highlights a rare cause of phrenic nerve injury in the absence of direct trauma. The clinical presentation may closely resemble diaphragmatic rupture.

Contributors
David Bell initiated the writing of the report and the MEDLINE search. Ajith Siriwardena supervised the writing of the report and the phrasing of the final draft and reviewed the adequacy of the literature search and review of relevant publications.

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